

First record of *Culex (Melanoconion) spissipes* (Theobald, 1903) (Diptera: Culicidae) in the Atlantic Forest of Bacia Platina, southern Brazil

Allan Martins da Silva,¹ Claudomiro Postai,² José Antônio Coeli,² Betina Westphal-Ferreira,³ Mário Antônio Navarro da Silva³

1 Secretaria de Estado da Saúde do Paraná, Laboratório Central, Rua Sebastiana Santana Fraga, 1001, CEP 83060-500, São José dos Pinhais, PR, Brazil. **2** Secretaria de Estado da Saúde do Paraná, 20ª Regional de Saúde, Núcleo de Vigilância Entomológica, Rua Francisco Murtinho, 115, CEP 85980-000, Guaira, PR, Brazil. **3** Universidade Federal do Paraná, Setor de Ciências Biológicas, Departamento de Zoologia, Laboratório de Entomologia Médica e Veterinária, Caixa Postal 19020, 81531-980, Curitiba, PR, Brazil.

Corresponding author: Allan Martins da Silva, allan.silva@sesa.pr.gov.br

Abstract

In this article the occurrence of *Culex (Melanoconion) spissipes* is recorded at the city of Terra Roxa, state of Paraná, South of Brazil. This record covers the species distribution in the Atlantic Forest of the Bacia Platina.

Key words

Culicidae, mosquito distribution, range extension, vector ecology, Atlantic Forest.

Academic editor: Gustavo Rossi | Received 20 December 2016 | Accepted 27 May 2017 | Published 28 July 2017

Citation: Silva AM da, Postai C, Coeli JA, Westphal-Ferreira B, Silva MAN da (2017) First record of *Culex (Melanoconion) spissipes* (Theobald, 1903) (Diptera: Culicidae) in the Atlantic Forest of Bacia Platina, southern Brazil. Check List 13 (4): 173–176. <https://doi.org/10.15560/13.4.173>

Introduction

The subgenus *Melanoconion* of *Culex* (Diptera: Culicidae) is widely distributed in South and Central America, including a number of Caribbean islands, as well as part of North America (United States and Mexico). Currently, 160 species of *Melanoconion* are known, of which 139 (87%) are endemic to South America (Pecor et al. 1992, Torres-Gutierrez and Sallum 2015).

In the tropics, the greatest number of *Melanoconion* species are found in the Amazon (Hutchings et al. 2005, 2010, 2013). They are also found in forests in the north and west of South America, and in parts of the Atlantic Forest, a complex including Brazil's predominant forests (Rossi 2015, Torres-Gutierrez and Sallum 2015).

Culex (Melanoconion) includes two clades: Mela-

noconion Section and Spissipes Section (Sallum and Forattini 1996, Harbach 2011, 2015). The subgenus *Melanoconion* includes most species, but data on natural infections indicate that Spissipes Section is more important from an epidemiological point of view. Since the distribution of Spissipes Section is not well known, new occurrence records of species in this clade are valuable.

Methods

This article records the occurrence of *Culex (Melanoconion) spissipes* (Theobald, 1903) in southern Brazil, collected on 8 January 2005 at Fazenda Curupay (24°01.99' S, 54°05.95' W (SAD69), ca 244 m above sea level), in the city of Terra Roxa Paraná state (Fig. 1). The area is part of the Terceiro Planalto Paranaense, in the



Figure 1. Occurrence of *Culex (Melanoconion) spissipes* in Central and South America (map with major rivers). Legend: **a**, distribution according to Sallum and Forattini (1996); **b**, Platina Basin with location of the new occurrence record (circle).

zone between the hydrographic basin of the Piquiri River and the slope that forms one of the small basins of the Paraná River next to the border with Mato Grosso do Sul. The average air temperature there varies between 21 °C and 22 °C, and the annual rainfall is between 1,600 mm and 1,800 mm (Maack 1968).

The abbreviation for generic-level taxa follows Reinert (2009).

Results

The specimen was identified using the dichotomous key of Sallum and Forattini (1996). *Culex (Mel.) spissipes* is easily distinguished from other *Melanoconion* of the Spissipes Section by the presence of setae along the acrostichal area, straight and clear decumbent scales on the vertex and presence of a spot formed by golden scales, found on the first 2/3 of the mesonotum (Figs 2, 3), among other characters.

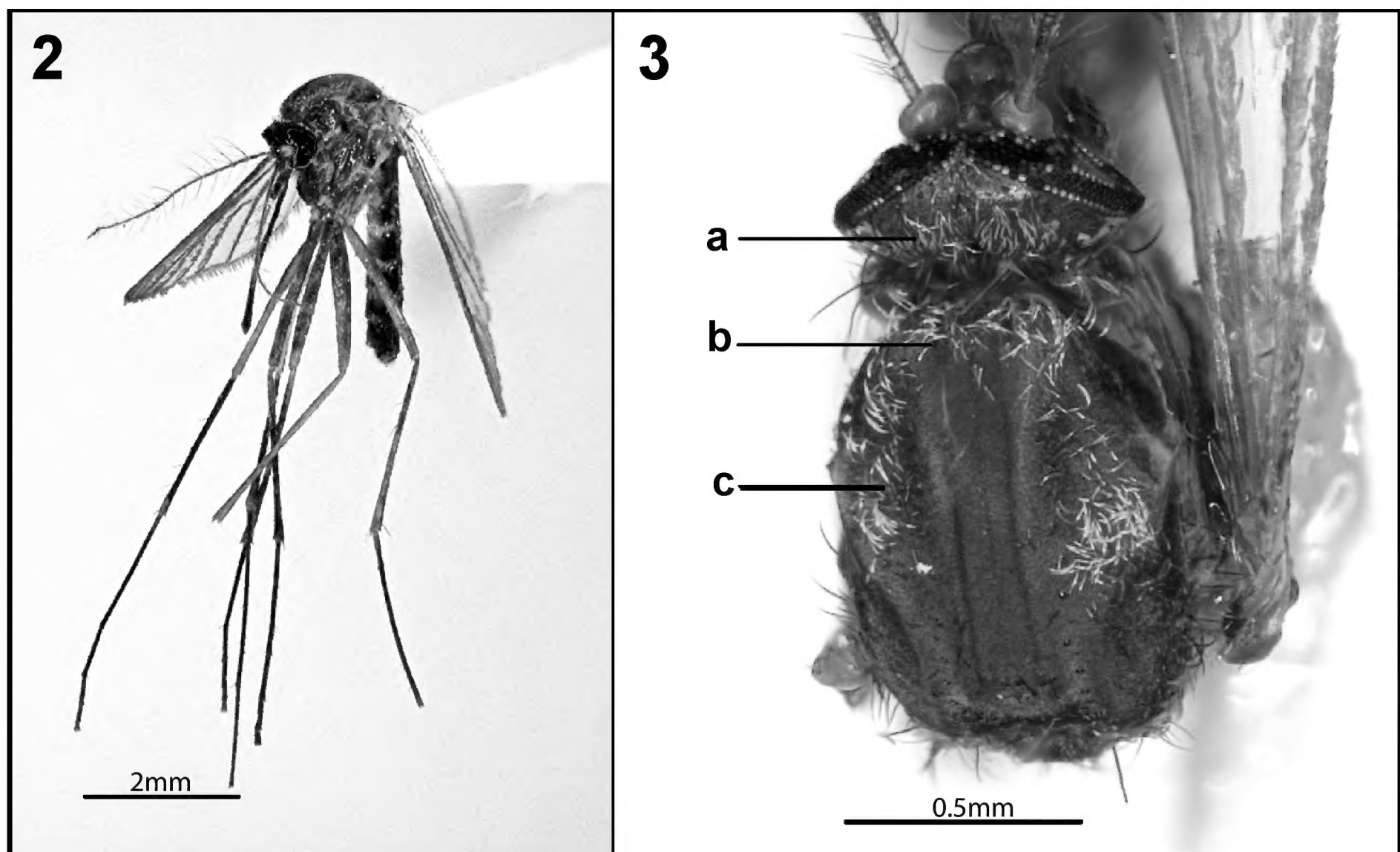
Dr Maria Anice Mureb Sallum, from the Núcleo de

Pesquisa Taxonômica e Sistemática em Entomologia Médica, Faculdade de Saúde Pública, Universidade de São Paulo, confirmed the identification of the specimen. A voucher specimen was deposited in the Entomological Collection Padre Jesus Santiago Moure (Diptera), Universidade Federal do Paraná, Brazil under the number, DZUP 180504.

Discussion

The epidemiological importance of *Cx. (Mel.) spissipes* resides in the fact that it is a potential vector of a diverse range of arboviruses. For instance, the Kairi (*Orthobunyavirus*), Bimiti, Caraparu, Oriboca, and Itaquí, viruses classified in the family Bunyaviridae, and the III-B variant of the Venezuelan equine encephalitis (EEV), classified in the family Togaviridae (Anderson et al. 1960, Shope et al. 1988, Walton and Grayson 1988, Vasconcelos et al. 1991).

In the same region of Paraná where the specimen was collected, some equine were detected with antibodies to



Figures 2, 3. Morphological characters of *Culex (Melanoconion) spissipes* specimen mounted on a triangle, deposited at the Entomologic Collection Padre Jesus Santiago Moure (Diptera), Universidade Federal do Paraná, voucher number: DZUP 180.504. **2.** Ventral/lateral view. **3.** Dorsal view of the scutum. Legends: **a:** straight and clear decumbent scales on the vertex; **b:** Acrostical setae present; **c:** two-thirds of the mesonotum covered with golden scales, forming a spot.

the Eastern and Western equine encephalitis, EEV, Saint Louis encephalitis, Maguari, Mucambo, and Pixuna arboviruses. However, immunological tests from mosquito samples, including pools of *Cx. (Mel.)* sp., were negative for virus isolation (Fernández et al. 2000).

The female of *Cx. (Mel.) spissipes* was collected via human attraction between 0920h and 0940h in the interior of a residual section of the seasonal semideciduous forest. The capture of this species during the day illustrates its opportunistic feeding habits on humans who approach its shelters in shady areas. Other studies have demonstrated that it is easy to collect females of *Cx. (Mel.) spissipes* in forested areas using human attraction (Sallum and Forattini 1996, Pecor et al. 2000).

Culex (Mel.) spissipes occurs in the Neotropical region, including Mexico, countries in Central America (Belize, Guatemala, Honduras, Panama, Trinidad and Tobago) and also the following South American countries: Bolivia, Brazil, Colombia, Ecuador, French Guiana, Peru, Suriname, and Venezuela (Pecor et al. 1992, 2000). In Brazil, the species occurs in the Amazon Region and in the Atlantic Forest areas that cover the hydrographic basins (which waters drain directly into the Atlantic Ocean). Before this study, its known southern limits were at the Vale do Ribeira region, in the state of São Paulo (Forattini et al. 1995).

The presence of *Cx. (Mel.) spissipes* in the Parana River Basin indicates that its distribution in South America is broader than previous estimates have shown.

It is possible that the species also occurs in other regions of the Bacia Platina (composed of the sub-basins of the Paraná, Paraguay and Uruguay rivers), primarily in areas of Argentina and Paraguay that are covered by Atlantic Forest.

Acknowledgements

We thank Dr Natal Jataí de Camargo and his team from Secretaria de Estado da Saúde do Paraná for making this study possible, Prof. Dr Maria Anice Mureb Sallum for confirming the identification of the species, and Kirsten Smyth for the revision of the English version of the manuscript.

Authors' Contributions

AMS developed the research project that resulted in the article. CP and JAC collected the specimen. AMS identified the specimen. AMS and BWF developed the distribution map. BWF photographed and edited the images. AMS wrote the text and AMS, CP, JAC, BWF and MANS read, made suggestions and accepted the last version of the manuscript.

References

- Anderson CR, Aitken THG, Speace JP, Downs WC (1960) Kairi virus, in new virus from Trinidad forest mosquitoes. *American Journal of Tropical Medicine and Hygiene* 9: 70–72.

- Fernández Z, Richartz R, Travassos da Rosa A, Soccol VT (2000) Identificação do vírus causador da encefalomielite equina, Paraná, Brasil. *Revista de Saúde Pública* 34: 232–235. <https://doi.org/10.1590/s0034-89102000000300004>
- Forattini OP, Sallum MAM, Kakitani I, Massad E, Marucci D (1995) Studies on mosquitoes (Diptera: Culicidae) and anthropic environment: 8- Survey of adult behaviour of *Spissipes* Section species of *Culex* (*Melanoconion*) in south-eastern Brazil. *Revista de Saúde Pública* 29 (2): 100–107. <https://doi.org/10.1590/s0034-89101995000200003>
- Harbach RE (2011) Classification within the cosmopolitan genus *Culex* (Diptera: Culicidae): the foundation for molecular systematics and phylogenetic research. *Acta Tropica* 120: 1–14. <https://doi.org/10.1016/j.actatropica.2011.06.005>
- Harbach RE (2015) Mosquito Taxonomic Inventory. <http://mosquito-taxonomic-inventory.info>, Accessed on: 2015-10-17.
- Hutchings RSG, Honegger RWH, Sallum MAM (2013) Culicidae (Diptera: Culicomorpha) from the central Brazilian Amazon: Nhamundá and Abacaxis Rivers. *Zoologia (Curitiba)* 30 (1): 1–14. <https://doi.org/10.1590/s1984-46702013000100001>
- Hutchings RSG, Hutchings RW, Sallum MAM (2010) Culicidae (Diptera, Culicomorpha) from the western Brazilian Amazon: juami-japurá ecological station. *Revista Brasileira de Entomologia* 54 (4): 687–691. <https://doi.org/10.1590/s0085-56262010000400022>
- Hutchings RSG, Sallum MAM, Ferreira RLM, Hutchings RW (2005) Mosquitoes of the Jaú National Park and their potential importance in Brazilian Amazonia. *Medical and Veterinary Entomology* 19 (4): 428–441. <https://doi.org/10.1111/j.1365-2915.2005.00587.x>
- Maack R (1968) Geografia Física do Estado do Paraná. Banco de Desenvolvimento do Paraná, Curitiba, 350 pp.
- Pecor JE, Jones J, Turell MJ, Fernandez R, Carbajal F, O'gulnn M, Sardalis M, Watts D, Zyzak M, Calampn C, Terry A (2000) Annotated checklist of the mosquito species encountered during arboviral studies in Iquitos, Peru (Diptera: Culicidae). *Journal of the American Mosquito Control Association* 16 (3): 210–218.
- Pecor JE, Mallampalli VL, Harbach RE, Peyton EL (1992) Catalog and illustrated review of the subgenus *Melanoconion* of *Culex* (Diptera: Culicidae). *Contributions of the American Entomological Institute* 27 (2): 1–228.
- Reinert JF (2009) List of abbreviations for currently valid generic-level taxa in family Culicidae (Diptera). *European Mosquito Bulletin* 27: 68–76.
- Rossi GC (2015) Annotated checklist, distribution, and taxonomic bibliography of the mosquitoes (Insecta: Diptera: Culicidae) of Argentina. *Check List* 11 (4): 1712. <https://doi.org/10.15560/11.4.1712>
- Sallum MAM, Forattini OP (1996) Revision of the *Spissipes* section of *Culex* (*Melanoconion*) (Diptera: Culicidae). *Journal of the American Mosquito Control Association* 12 (3): 517–600.
- Shope RE, Woodhall JP, Da Rosa AT (1988) The epidemiology of diseases caused by viruses in Groups C and Guama (Bunyaviridae). In: Monath TP (Ed.) *The Arboviruses: Epidemiology and Ecology*. CRC Press, Boca Raton, 37–52.
- Theobald FV (1903) A monograph of the Culicidae of the World. British Museum of Natural History, London, 391 pp. <https://doi.org/10.5962/bhl.title.58067>
- Torres-Gutierrez C, Sallum MAM (2015) Catalog of the subgenus *Melanoconion* of *Culex* (Diptera: Culicidae) for South America. *Zootaxa* 4028 (1): 1–50. <https://doi.org/10.11646/zootaxa.4028.1.1>
- Vasconcelos PFC, Travassos-da-Rosa JFS, Travassos-da-Rosa APA, Dégallier N, Pinheiro FP, Sá Filhou GC (1991) Epidemiologia das encefalites por arbovírus na amazonia brasileira. *Revista do Instituto de Medicina Tropical* 33 (6): 465–476. <https://doi.org/10.1590/s0036-46651991000600007>
- Walton TE, Grayson MA (1988) Venezuelan equine encephalomyelitis. In: Monath TP (Ed.) *The Arboviruses: Epidemiology and Ecology*, vol. 4. CRC Press, Boca Raton, 203–231.